

What is claimed is:

1. A measuring sensor for determining a physical property of a measured gas, especially for determining the oxygen concentration or the contaminant concentration in the exhaust gas of internal combustion engines, having a sensor element (30) which is able to be exposed to the measured gas, that is at least partially coated with a protective layer (26) protecting against harmful components in the measured gas, wherein the protective layer (26) is made up of highly active  $\gamma$ - or  $\delta$ - aluminum oxide ( $Al_2O_3$ ) having additives of the alkaline metals group, the alkaline earth group, the IV B subgroup or the lanthanides group.
2. The measuring sensor as recited in Claim 1,  
wherein the additives are oxides, carbonates, acetates or nitrates of these elements.
3. The measuring sensor as recited in Claim 1 or 2,  
wherein the protective layer (26) is extremely porous and has a great layer thickness, which is preferably greater than  
 $250\text{ }\mu\text{m}$ .
4. The measuring sensor as recited in one of Claims 1 - 3,  
wherein the sensor element (30) has a ceramic element (10) made of solid electrolyte layers (13, 15, 22, 23), an outer electrode (11) situated on the surface of the ceramic element (10), and a porous protective lining (12) coating the electrode (11); and the protective layer (26) covers the protective lining (12).
5. A method for producing the protective layer on the sensor element of the measuring sensor as recited in Claim 4,  
wherein the components of protective layer (26) are prepared, using proportions of an organic and an inorganic binding agent and a pore-forming material in a water-based manner to form a pourable or spreadable substance; the substance is applied to the sensor element (30) by dipping, rolling spraying, spreading, dripping or printing; and, for drying the applied substance, the sensor element (30) is exposed to a temperature between  $20^0\text{ C}$  and  $180^0\text{ C}$ , and subsequently, for burning off the binding agent proportion and the pore-forming material proportion and for sintering on the substance, the sensor element (30) is exposed to a temperature between  $150^0\text{ C}$  and  $1150^0\text{ C}$ .

6. The method as recited in Claim 5,  
wherein, as inorganic binding agent, aluminum nitrate or an aluminum hydroxide gel is added, and as organic binding agent, a water soluble or a water dispersible polymer is added.
7. The method as recited in Claim 5 or 6,  
wherein the sensor element (30) is produced having a surrounding frame (27), preferably made of densely sintered zirconium oxide ( $ZrO_2$ ), on the protective lining (12) and is sintered; and the substance is imprinted into the frame (27), or is painted in or dripped in.
8. The method as recited in Claim 7,  
wherein, the sensor element (30) is produced and sintered having pillars (28), proceeding from the surface of the protective lining (12) within the frame (27), which preferably are made of the same material as the protective lining (12).
9. The method as recited in Claim 5 or 6,  
wherein the sensor element (30) is produced and sintered having a porous adhesive layer (29), that coats the protective lining (12), whose porosity is substantially greater than that of the protective lining (12); and the substance is imprinted, painted, rolled or dripped onto the adhesive layer (29).
10. The method as recited in Claim 9,  
wherein, as material for the protective lining (12), zirconium oxide ( $ZrO_2$ ) having a small proportion of aluminum oxide ( $Al_2O_3$ ) is used, and as material for the adhesive layer, zirconium oxide ( $ZrO_2$ ) having a substantially greater proportion of aluminum oxide ( $Al_2O_3$ ) is used, and a substantially greater proportion of a pore-forming material is added to the adhesive material as compared to that which is added to the protective lining material.